

CLAIMS

We claim:

1. In a computing system providing multi-threaded programming support, a system
5 comprising:

a thread monitor class providing thread monitoring services to threads of a multi-threaded process, the thread monitor class including:

a thread registration method to register a thread for monitoring by the class; and

a thread monitoring supervisor to monitor all threads registered for monitoring
10 operation of threads that invoke the thread registration method.

2. The system of claim 1 wherein the thread monitor class further includes:

a thread un-registration method to remove a prior registration of a thread for
monitoring by the class.

3. The system of claim 1 wherein the thread monitor class further includes:

a stop thread monitoring method to terminate monitoring of all threads registered for
monitoring by the class.

4. The system of claim 1 wherein the thread monitor class further includes:

a thread HeartBeat method to signal a HeartBeat from a thread registered for
monitoring by the class.

5. The system of claim 1 wherein the thread registration method comprises:

a thread alive check registration method invoked by a thread to register for
25 monitoring by the class wherein the monitoring comprises periodically verifying that the
invoking thread is still alive.

6. The system of claim 1 wherein the thread registration method comprises:

a thread poll registration method invoked by a thread to register for monitoring by
30 the class wherein the monitoring comprises periodically verifying that the invoking thread is
properly operating by invoking a poll method derived from the thread poll registration
invocation.

7. The system of claim 1 wherein the thread registration method comprises:

5 a thread HeartBeat registration method invoked by a thread to register for monitoring by the class wherein the monitoring comprises periodically verifying that the invoking thread is still alive based on receipt of periodic HeartBeat method invocations from the thread invoking the thread HeartBeat registration method.

8. The system of claim 1 wherein the thread monitoring supervisor is instantiated within a main thread of a multi-threaded program.

10

9. The system of claim 1 wherein the thread monitoring supervisor is further operable to restart an inoperable thread.

10. The system of claim 1 wherein the thread monitoring supervisor is further operable to restart the process that includes an inoperable thread.

15

11. A method for monitoring operability of multiple threads of a computer process comprising the steps of:

instantiating a thread monitoring supervisor in a thread of a multi-threaded process;
20 registering an additional thread of the multi-threaded process for monitoring of its operation by the thread monitoring supervisor; and
monitoring the operability of the additional thread by operation of the thread monitoring supervisor.

25

12. The method of claim 11

wherein the step of registering further comprises registering the additional thread as a HeartBeat thread for monitoring according to HeartBeat signals,

wherein said additional thread is operable to periodically communicate a HeartBeat signal with the monitoring supervisor, and

30

wherein the step of monitoring further comprises detecting periodic receipt of HeartBeat signals to monitor operability of said additional thread.

13. The method of claim 11

wherein the step of monitoring further comprises determining whether said additional thread is still alive to monitor operability of said additional thread.

14. The method of claim 11

5 wherein the step of registering further comprises registering the additional thread as a polling thread associated with a poll function to indicate the operability status of the additional thread, and

 wherein the step of monitoring further comprises periodically invoking the poll function associated with the additional thread to monitor operability of the additional thread.

10

15. The method of claim 11 wherein the step of instantiating further comprises instantiating the thread monitoring supervisor in a main thread of the multi-threaded process.

16. The method of claim 11 further comprising restarting an inoperable thread.

15

17. The method of claim 11 further comprising restarting a process that includes an inoperable thread.